

## **AMENDMENTS TO THE CLAIMS**

The following set of claims replaces all previous versions of claims:

1-105. (Cancelled)

106. (Currently amended) An isolated recombinant protein comprising a variant of wild-type Photinus pyralis luciferase of SEQ ID NO:37, wherein the amino acid sequence of said recombinant protein has no more than 30 amino acid differences as compared to the amino acid sequence of SEQ ID NO:37, wherein the recombinant protein has alanine at each of positions 214 and 232 of SEQ ID NO:37, and wherein the recombinant protein has luciferase activity and increased thermostability as compared to the wild-type Photinus pyralis luciferase of SEQ ID NO:37. An isolated recombinant protein comprising a variant form of SEQ ID NO:38, said variant form having no more than 29 amino acids other than position 214 of SEQ ID NO:38 which are different from the amino acid sequence set forth in SEQ ID NO:38, and wherein the recombinant protein comprises a variant form of SEQ ID NO:41 wherein said variant form comprises no more than 27 amino acids other than positions 214, 232 and 354 of SEQ ID NO:41 which are different from the amino acid sequence set forth in SEQ ID NO:41, and wherein the recombinant protein has luciferase activity and increased thermostability as compared to wild-type Photinus pyralis luciferase.

107-108. Cancelled.

109. (Currently amended) The isolated recombinant protein of claim 106, further comprising a substitution at position 214 wherein the recombinant protein comprises a variant form of SEQ ID NO:40 wherein said variant form comprises no more than 28 amino acids other than positions 214 and 354 of SEQ ID NO:37 [[40]] to other than glutamic acid, which are different from the amino acid sequence set forth in SEQ ID NO:40.

110-111. Cancelled.

112. (Currently amended) An isolated nucleic acid sequence which encodes the recombinant protein according to claim 106.

113. (Currently amended) A vector comprising the nucleic acid ~~sequence~~ according to claim 112.

114. (Previously presented ) An isolated cell transformed with the vector according to claim 113.

115. (Previously presented) The cell according to claim 114 which is a prokaryotic cell.

116. (Previously presented) The cell according to claim 114 which is a plant cell.

117. (Previously presented) A plant comprising the cell according to claim 116.

118. (Currently amended) A bioluminescent assay comprising the steps of:  
contacting the recombinant protein of claim 106 with luciferin and detecting bioluminescence. ~~In a bioluminescent assay which comprises a luciferase/luciferin reaction and detection of bioluminescence, the improvement comprising contacting the recombinant protein according to claim 106 in said reaction compared with contacting the corresponding wild-type luciferase in said reaction.~~

119. (Currently amended) A kit comprising the recombinant protein according to claim 106.

120. (Previously presented) The kit according to claim 119 which further comprises luciferin.

121-124. (Cancelled)

125. (Previously presented) An isolated recombinant protein comprising SEQ ID NO:41, wherein the recombinant protein has luciferase activity and increased thermostability as compared to wild-type *Photinus pyralis* luciferase.

126. (Previously presented) An isolated recombinant protein comprising SEQ ID NO:42, wherein the recombinant protein has luciferase activity and increased thermostability as compared to wild-type *Photinus pyralis* luciferase.

127-128. (Cancelled)

129. (Currently amended) An isolated nucleic acid ~~sequence~~ which encodes the recombinant protein according to claim 125.

130. (Currently amended) An isolated nucleic acid ~~sequence~~ which encodes the recombinant protein according to claim 126.

131-132. (Cancelled)

133. (Currently amended) A vector comprising the nucleic acid ~~sequence~~ according to claim 129.

134. (Currently amended) A vector comprising the nucleic acid ~~sequence~~ according to claim 130.

135-136. (Cancelled)

137. (Previously presented) An isolated cell transformed with the vector according to claim 133.

138. (Previously presented) An isolated cell transformed with the vector according to claim 134.

139-140. (Cancelled)

141. (Previously presented) The cell according to claim 137 which is a prokaryotic cell.

142. (Previously presented) The cell according to claim 138 which is a prokaryotic cell.

143-144. (Cancelled)

145. (Previously presented) The cell according to claim 137 which is a plant cell.

146. (Previously presented) The cell according to claim 138 which is a plant cell.

147-148. (Cancelled)

149. (Previously presented) A plant comprising the cell according to claim 145.

150. (Previously presented) A plant comprising the cell according to claim 146.

151-152. (Cancelled)

153. (Currently amended) A bioluminescent assay comprising the steps of:  
contacting the recombinant protein of claim 125 with luciferin and detecting bioluminescence.  
~~In a bioluminescent assay which comprises a luciferase/luciferin reaction and detection of bioluminescence, the improvement comprising contacting the recombinant protein according to claim 125 in said reaction compared with contacting the corresponding wild-type luciferase in said reaction.~~

154. (Currently amended) A bioluminescent assay comprising the steps of: contacting the recombinant protein of claim 126 with luciferin and detecting bioluminescence.  
~~In a bioluminescent assay which comprises a luciferase/luciferin reaction and detection of bioluminescence, the improvement comprising contacting the recombinant protein according to claim 126 in said reaction compared with contacting the corresponding wild-type luciferase in said reaction.~~

155-156. (Cancelled)

157. (Currently amended) A kit comprising the recombinant protein according to claim 125.

158. (Currently amended) A kit comprising the recombinant protein according to claim 126.

159-160. (Cancelled)

161. (Previously presented) The kit according to claim 157 which further comprises luciferin.

162. (Previously presented) The kit according to claim 158 which further comprises luciferin.

163. (Currently amended) An isolated recombinant protein comprising a variant of wild-type  
*Photinus pyralis* luciferase of SEQ ID NO:37, wherein the amino acid sequence of said

recombinant protein has no more than 30 amino acid differences as compared to the amino acid sequence of SEQ ID NO:37, wherein the recombinant protein has alanine, leucine, and alanine at positions 214, 215, and 232, respectively, of SEQ ID NO:37, and wherein the recombinant protein has luciferase activity and increased thermostability as compared to the wild-type Photinus pyralis luciferase of SEQ ID NO:37. An isolated recombinant protein comprising a variant form of SEQ ID NO:38, said variant form having no more than 29 amino acids other than position 214 of SEQ ID NO:38 which are different from the amino acid sequence set forth in SEQ ID NO:38, and wherein the recombinant protein comprises a variant form of SEQ ID NO:42 wherein said variant form comprises no more than 26 amino acids other than positions 214, 215, 232 and 354 of SEQ ID NO:42 which are different from the amino acid sequence set forth in SEQ ID NO:42, and wherein the recombinant protein has luciferase activity and increased thermostability as compared to wild-type *Photinus pyralis* luciferase.

164-165. Cancelled.

166. (Currently amended) The isolated recombinant protein of claim 163, further comprising a substitution at position wherein the recombinant protein comprises a variant form of SEQ ID NO:40 wherein said variant form comprises no more than 28 amino acids other than positions 214 and 354 of SEQ ID NO:37 [[40]] to other than glutamic acid, which are different from the amino acid sequence set forth in SEQ ID NO:40.

167. (Currently amended) An isolated nucleic acid sequence which encodes the recombinant protein according to claim 163.

168. (Currently amended) A vector comprising the nucleic acid sequence according to claim 167.

169. (Previously presented) An isolated cell transformed with the vector according to claim 168.

170. (Previously presented) The cell according to claim 169 which is a prokaryotic cell.

171. (Previously presented) The cell according to claim 169 which is a plant cell.

172. (Previously presented) A plant comprising the cell according to claim 171.

173. (Currently amended) A bioluminescent assay comprising the steps of:  
contacting the recombinant protein of claim 163 with luciferin and detecting bioluminescence.  
~~In a bioluminescent assay which comprises a luciferase/luciferin reaction and detection of bioluminescence, the improvement comprising contacting the recombinant protein according to claim 163 in said reaction compared with contacting the corresponding wild-type luciferase in said reaction.~~

174. (Currently amended) A kit comprising the recombinant protein according to claim 163.

175. (Previously presented) The kit according to claim 174 which further comprises luciferin.